

**OPERATING MANUAL**

**VANE MODEL 410**

**DISTRIBUTORGRAPH**

**VANE ELECTRICAL INSTRUMENTS PTY. LIMITED**

**17-19 Anthony Street,  
Melbourne**

**DIVISION OF  
GEO. H. SAMPLE AND SON PTY. LTD.**

**280 Castlereagh Street,  
Sydney**



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## DESCRIPTION

This instrument is designed expressly for the precision testing and calibration of ignition distributors as fitted to all types of vehicles and stationary engines. In accordance with modern practice these tests are applied under conditions as near to those met in actual service as possible.

The machine drives the distributor, firmly held in a precision machined clamp, with a robust  $1\frac{1}{5}$  h.p. motor over a wide range of speeds (0-3000 r.p.m.). The drive is transmitted through a flexibly mounted but securely attached 3 jaw chuck which eliminates the need for a large number of loose adaptors of various types. This also ensures that all future drives can easily be accommodated without the additional expense of new fittings.

Provision is made for the following tests:—

- Dwell angle
- Centrifugal advance
- Vacuum advance
- Synchronisation

In addition to the above, which are tests involving finite measurements, the distributor can be tested for the faults listed below:—

- Worn cams
- Bent shafts
- Weak springs
- Point bounce

## CONTROLS

The controls on the front panel are four in number, two of these are motor controls and the others a vacuum pump and test selector.

The function of these controls are as follows:—



## **Power Switch**

This switch controls the direction of drive and also the power mains entering the unit, when the unit is not in use it should be turned to the OFF position.

## **Speed Control**

This controls the speed of the motor and MUST always be turned to OFF before turning the POWER switch to either LEFT HAND or RIGHT HAND. If during a test it is desired to stop the motor for a short period (i.e. for point cleaning or adjustment) it is sufficient to turn the SPEED CONTROL to OFF and leave the POWER switch set to the direction of rotation.

## **Vacuum Pump**

This is internally connected to the VACUUM outlet on the top of the panel and to the Vacuum gauge on the instrument panel. It is operated by drawing the knob upwards until the desired reading is indicated on the gauge and then rotating the knob either to the left or right to lock it. To release the vacuum, reverse the locking procedure, free the knob and allow it to return to its original position.

## **Test Selector**

The function of the meter and the type of test applied is controlled by this switch. In the DWELL ANGLE position the meter indicates the amount of cam rotation during which the breaker points are closed. This should be a constant figure regardless of speed and is usually measured at approximately 1000 r.p.m. When the TEST SELECTOR switch is turned to either of the speed ranges (3000 r.p.m. or 1500 r.p.m.) the lamps used for ADVANCE and SYNCHRONISATION tests will light under the rotating discs. The speed readings shown on the meter must always be read as DISTRIBUTOR r.p.m. on both scales.

## **SETTING UP INSTRUCTIONS**

- (1) Assemble the steel mast in the main casting tightening the Allen screw in the supporting boss with the key provided.



- (2) Fit the clamp arm to the mast with the distributor clamp screw on the RIGHT hand side.
- (3) Plug the instrument into a 220-240 Volt 50 CPS power outlet first making sure that the SPEED control and POWER switch are in the OFF positions.
- (4) Mount the distributor to be tested in the clamp arm and tighten the locking screw.
- (5) Carefully line up the distributor shaft with the chuck and tighten the chuck on the shaft.
- (6) Lift the distributor slightly to avoid binding and tighten the lock screw holding the clamp arm to the steel mast.
- (7) Connect the jumper lead from the BREAKER terminal to the distributor primary terminal.
- (8) Connect the VACUUM outlet on the panel to the distributor diaphragm with one of the couplings and the rubber hose provided.
- (9) Turn the POWER switch to L.H. or R.H. depending on the direction of rotation required for the distributor under test. Rotate the SPEED control clockwise and the distributor will commence to rotate.

The instrument is now ready to test the distributor through all phases of operation.

## TESTING DISTRIBUTORS

Distributors that are used on all four-cycle engines are geared 1 to 2, which means that the rotor makes one revolution for every two revolutions of the crankshaft. Therefore, by dividing 360 degrees (one revolution) by the number of cylinders, we find the number of distributor degrees between sparks. As an example, a spark occurs every 60 degrees for a 6 cylinder engine. Since the circular degree ring of the instrument is graduated to 360 degrees, we can measure on it the number of degrees apart the sparks are occurring. The number of distributor degrees between sparks will always be equal regardless of their number or speed of operation if the distributor is in perfect condition. Variations will be noted when abnormal conditions are present, such as uneven cam, bent shaft, etc.



## **Dwell Angle**

The term "DWELL ANGLE" is used to denote the amount of distributor cam rotation through which the points are closed. This is always expressed in degrees. Regardless of engine speed the dwell angle always remains the same. The only conditions that vary are the length of time the points are closed and also the speed at which they open and close. Correct Dwell Angle is important to ensure proper saturation of the coil primary at all speeds.

### **Dwell Angle Measurement**

With the distributor connected as previously described, switch the TEST SELECTOR to 1500 r.p.m. and adjust the speed to 1000 r.p.m. Switch to DWELL ANGLE and read the appropriate scale for the number of cylinders in the vehicle. If the Dwell Angle does not agree with the maker's specifications the point setting should be adjusted until the correct figure is reached. This may be done with the machine running and changes of meter reading noted instantly.

If the distributor is equipped with double breaker points, block open one set with heavy paper or some fibre insulation material while the other points are being tested. Repeat this procedure for the blocked open points.

### **Centrifugal Advance**

Switch the TEST SELECTOR to either 3000 r.p.m. or 1500 r.p.m. and run the distributor at the lowest possible even speed. Adjust the moveable protractor ring until the 0 degrees graduation registers with one of the lighted arrows. Increase the speed to the figures laid down in the specifications and read the advance in terms of degrees of movement of the red arrow point. As the speed increases the advance will be in the direction opposite to that of rotation. Variations of more than two degrees from specified figures should be investigated.

### **Vacuum Advance**

Run the distributor at 1000 r.p.m. and then set one flash to 0 degrees. Operate the pump and the light should advance according to specification. The full angle of advance is reached when the light will move no further regardless of increased vacuum. If it is desired to hold a steady reading the pump knob can be rotated 90 degrees to lock it in any position.



## Synchronising Double Breaker Distributors

Turn the TEST SELECTOR to 3000 r.p.m. and operate the distributor at 1000 r.p.m. Move the protractor until one of the flashes is at the zero degrees mark. If the distributor is the type having half as many lobes on the cam as there are cylinders in the engine, adjust the adjustable breaker plate assembly until the flashes caused by the adjustable points are in correct relationship, in accordance with the maker's specifications. If the distributor is the type having the same number of lobes on the cam as there are cylinders in the engine, insert a piece of bakelite or fibre between the stationary contact points. Adjust the adjustable breaker plate assembly until the flashes caused by the adjustable points occur at the same place on the protractor scale, or are the correct relationship in accordance with the specifications. If the distributor has two primary terminals, use the one connected to the stationary points for setting one of the flashes to the zero mark on the protractor scale. Then move the lead to the terminal connected to the adjustable points. Set the adjustable breaker plate assembly until the flashes caused by the adjustable points occur at the same place on the protractor scale as the stationary points, or in accordance with specifications. Re-check the ignition timing when installing the distributor on the vehicle.

### Ford V8 Distributors (1941-48) "Crab-type"

- (1) Remove the vacuum brake and mount the distributor on the adaptor flange then secure this in the clamp arm. Clamp the adaptor provided in the chuck and engage the distributor drive.
- (2) Operate at 250 r.p.m. or less (L.H. rotation).
- (3) Block open the BOOSTER points. These are the points marked R.H. on the plate (from the driver's position when the distributor is on the engine).
- (4) Set the timing screw so that it is centred in its slot.
- (5) Adjust the firing points to a dwell angle of 24 degrees.
- (6) Remove the blocking from the booster points and adjust them so that the total dwell angle is 36 degrees.
- (7) Clear lubricate and re-install vacuum brake. Connect to vacuum and see that the plunger rises and falls smoothly from 10 inches vacuum and above.
- (8) Final adjustment of vacuum setting is made on the vehicle. Slacken off until the engine just pings on hard acceleration, then screw in slightly and lock in position.



## **"Dome Type" Distributor to 1940**

The above instructions apply to the 1932-40 distributor which is mounted direct on the flange (three holes).

### **Worn Cam, Worn Shaft, Worn Shaft Bearing, Bent Shaft**

The above conditions will cause the small spots of light which appear behind the arrow heads to be off centre. The width of the arrow heads is 4 degrees, this is the maximum allowable error (2 degrees plus or minus) permitted by most manufacturers in their specifications. If the spots of light are not behind the arrow heads corrective measures must be taken.

### **Weak Breaker Springs**

Excessive use and poor material can cause a spring to lose its tension, this allows point bounce which is indicated by false flashes occurring after the correct flash at high speed.

### **Worn Vacuum Mechanism**

The symptoms of this trouble are insufficient vacuum advance and sudden and erratic changes of DWELL ANGLE with changes of applied vacuum. From maximum to zero vacuum the permissible change in dwell angle is 2 degrees.

### **Leaking Vacuum Diaphragm**

With the maximum vacuum required for full advance applied the vacuum should not drop by more than 1 inch per minute.

Whilst the following are not supplied with the instrument it will be found they are of great assistance in the servicing of distributor prior to testing:—

DISTRIBUTOR POINT ALIGNMENT TOOL

DISTRIBUTOR SPRING TENSION GAUGE

DISTRIBUTOR VICE CLAMP



